

# SURGICAL TECHNIQUE

## EQUINE CERVICAL IMPLANTS

For ventral cervical arthrodesis (C2 to C7)



**By Fabrice Rossignol  
With Ariane Campos  
Clinique Vétérinaire de Grosbois**

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## INTRODUCTION :

### Intervertebral Spacer

The Intervertebral Spacer is a 3D printed and HIP (Hot Isostatic Pressing) processed titanium implant. 3D printing made it possible to create an innovative implant pattern that promotes osteointegration.

It has been designed from CT scans to fit the shape of the intervertebral disc. This spacer should help to maintain intervertebral disk space and prevent potential collapse while allowing bone fusion thanks to the specific internal pattern with micro holes and trabeculae.

Once in place it is stabilized with 2 slightly divergent screws.

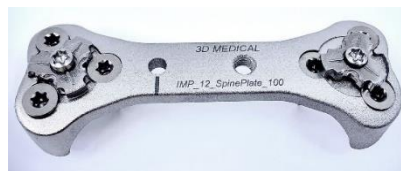


### Cervical Plate

The Cervical plate, also 3D printed and made from HIP (Hot Isostatic Pressing) processed titanium, presents the same specific pattern as the spacer at bone/plate interfaces.

Size (90 and 100mm) and shape of the plate have been chosen from CT scans.

Screw lockers have been designed to prevent screw pull-out.



### Screws : Thread profile

Because vertebral body is mostly composed of cancellous bone, unique 6.5/4.0mm screws have been designed (cancellous screw profile; 5.0/3.0mm for the Spacer Screws).

The screws are self-tapping and self-drilling removing the risk of inadvertently perforating the cervical canal during drilling or tapping. The adapted screw length can be selected using radiography or fluoroscopy to get a maximal purchase in the vertebral bone.



## Implantation set

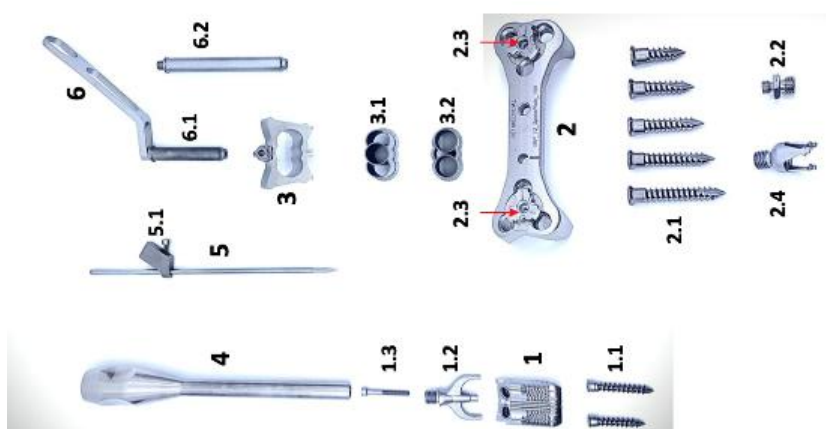
An implantation set has been designed to accurately position and fix the spacer and the plate. The kit includes:

A long multipurpose holder to be connected to various implants and instruments throughout the surgery.

A pin with targeting marker to choose the appropriate positioning and orientation of the aiming device for disc removal.

An aiming device with multiple drill guides to partially remove the disc and a thin layer of surrounding compact bone, in order to accurately place the spacer.

Customized drill guides and screw lockers to place and secure the plate screws.

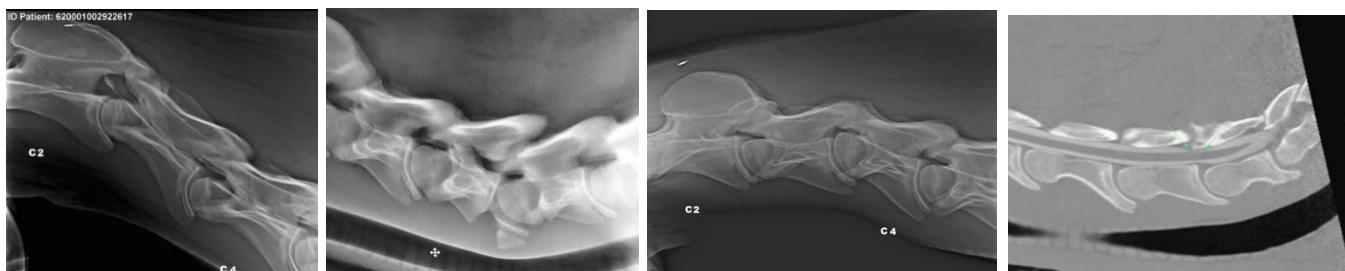


## Principles

Potential advantages of the equine cervical implants are to allow realignment, to provide stability in flexion, extension, and lateral bending, to disperse the stress on a wider surface, and to help to prevent intervertebral collapse. This system also promotes bone fusion through the internal frame of the spacer.

## Headless compression screw

The 3D Medical Cervical Implants Set is intended for Cervical Fractures, Cervical Luxations and Cervical Stenotic Myelopathy in horses and foals from 8 months onward.



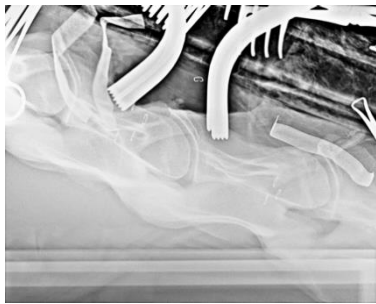
## Step 1: Preparation

### Position patient

The horse is positioned in dorsal recumbency with the neck fixed in a strict sagittal position.

### Approach

The approach is standard: After blunt division of sternothyroid muscles, the trachea is retracted to the left, and the longi colli muscles are sharply divided. The vertebrae are exposed, and their ventral aspect are flattened using a curved osteotome and rongeurs.



## Step 2: Ancillary Device positioning

### Instruments:

- Pin with aiming marker
  - Guiding device
  - Multipurpose Holder
- 
- Place the pin sagittally just caudal to the growth plate
  - Use the radiopaque marker to confirm the appropriate position of the pin
  - Remove the marker
  - Fix the guiding device to the holder, slide it on the pin and fix it with a mallet
  - Disconnect the holder, remove the pin and reconnect the holder on the guiding device

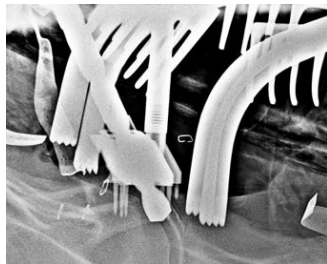


## Step 3: Drilling of the intervertebral disc

### Instruments:

- Guiding device
- Central hole Drill Guide
- Abaxial holes Drill Guide
- Multipurpose Holder
- 11 mm Drill

- Loosen slightly the Multipurpose Holder, place the Central hole Drill Guide in the Guiding Device, tighten the Holder and drill 35mm depth with the 11 mm drill.
- Use the same method to place the Abaxial hole Drill Guide and drill abaxially 35mm depth with the 11 mm drill.

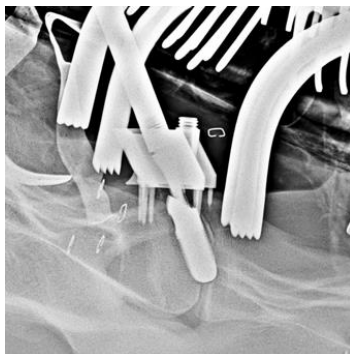


## Step 4: Placement of the Intervertebral Spacer

### Instruments:

- Guiding device
- Multipurpose Holder
- Intervertebral Spacer
- Fork tool
- Screw for the Fork tool
- Spacer Screw
- Drill Guide for the Spacer Screws (2.5mm)
- 2mm Hexagonal screwdriver

- Connect the Intervertebral Spacer to the Fork tool and to the Multipurpose Holder
- Insert the Intervertebral Spacer through the Guiding device
- Remove the Holder and use the 2mm hexagonal screwdriver to disconnect the Fork tool
- Remove the Guiding device

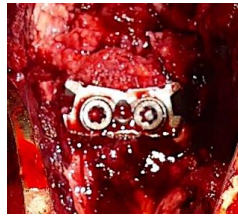
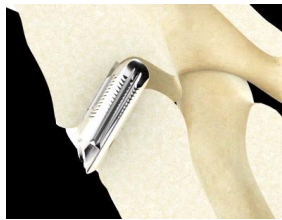


## Step 5: Fixation of the Intervertebral Spacer

### Instruments:

- Spacer Screws
- Spacer Screws Drill Guide
- 2.5mm Drill
- Star T20 screwdriver

- Use the Drill Guide for Spacer Screws and drill 2cm depth with a 2.5mm drill
- Implant the Spacer Screws using Star T20 screwdriver

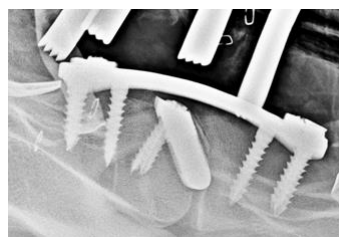


## Step 6: Cervical Plate implantation

### Instruments:

- Multipurpose Holder
- Cervical Plate (with Screw Lockers)
- Plate/Holder connection tool
- Plate Screws
- Drill Guide for the Spacer Screws (2.5mm)
- Tool for screw lockers
- 4mm Drill
- Star T25 screwdriver







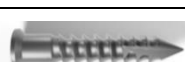

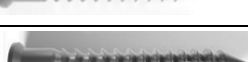
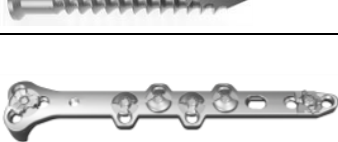










- Contour the plate if necessary
- Fix the plate to the holder
- Place the plate so the spacer can be seen through hole A
- Using the drill guide for Plate Screws, drill 2.5cm depth with 4mm drill through holes 3 and 4
- Implant the Plate Screws through holes 3 and 4 using the Star T25 screwdriver
- Using the drill guide for Plate Screws, drill 2.5cm depth with 4mm drill through holes 1, 2, 5, and 6
- Implant the Plate Screws through holes 1, 2, 5, and 6 using the Star T25 screwdriver
- Rotate and fix the screw lockers using Star T25



## REFERENCE OF INSTRUMENTS ADULT

INS_1_Ancilaire_Base_Rev0		INS_1_Ancilaire_Base_rev1	
INS_2_Rev0_Ancilaire_top_1		INS_2_Rev1_Ancilaire_top_1	
INS_3_Rev0_Ancilaire_top_2		INS_3_Rev1_Ancilaire_top_2	
INS_4_Fork		INS_5_Screw_Fork	
INS_6_Drill_Guide_Cage		INS_7_Moov_Plate	
INS_8_Moov_Lock_Screw			
INS_9b+ INS_67_ScrewDriver		INS_10a_Drill_Guide_Plate_Lock ed	
INS_11_Handle_Drill_Guide		INS_12_Needle	
INS_13_Guide_RX		INS_26_DRILL Ø4mm	
INS_68_INS_68 Clé Allen Torx T10			
INS_69_Pic Ancillère L15 T10 M4		INS_70_Pic Ancillère L10 T10 M4	
INS_71_Pic Outil Femelle T10		INS_67_DRILL Ø2.5mm	
INS_42_Rev01.2 BAGUE FORET 4,5		INS_76_BAGUE DIAM 2.5 DRILL	
INS_77_BAGUE DIAM 11		IN_82_DRILL Ø11	

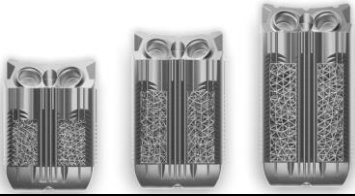










## REFERENCE OF IMPLANTS ADULT

IMP_1_Spine_Cage		Size :
IMP_2_Screw_Spine_Cage_L30		
IMP_3_Screw_Spine_Cage_L35		
IMP_12_SpinePlate_100 IMP_5_Lock_Screw IMP_6_M4_Screw		
IMP_7_Screw_SpinePlate_L25		
IMP_8_Screw_SpinePlate_L30		
IMP_9_Screw_SpinePlate_L35		
IMP_10_Screw_SpinePlate_L40		
IMP_11_Screw_SpinePlate_L45		
IMP_13_DoublePlate IMP_14_Lock_ScrewDBL IMP_15_Lock_ScrewDBL_X IMP_6_M4_Screw		
IMP_16_Screw_Sphere_35		
IMP_17_Screw_Sphere_40		
IMP_27_Screw_SpinePlate_Lock_L25		
IMP_28_Screw_SpinePlate_Lock_L30		
IMP_29_Screw_SpinePlate_Lock_L35		
IMP_30_Screw_SpinePlate_Lock_L40		
IMP_31_Screw_SpinePlate_Lock_L45		
IMP_32_SpinePlate_90_Curve_2,5°_Lock IMP_5_Lock_Screw IMP_6_M4_Screw		
IMP_85_SpinePlate_90_Curve_5°_Lock IMP_5_Lock_Screw IMP_6_M4_Screw		
IMP_86_SpinePlate_90_Curve_10°_Lock IMP_5_Lock_Screw IMP_6_M4_Screw		

## REFERENCE OF INSTRUMENTS POULAIN

INS_14_Rev0_Poulain_Ancilaire_Base		INS_14_Rev01_Poulain_Ancilaire_Base	
INS_15_Rev0_Poulain_Ancilaire_Top_1		INS_15_Rev1_Poulain_Ancilaire_Top_1	
INS_16_Rev0_Poulain_Ancilaire_Top_2		INS_16_Rev1_Poulain_Ancilaire_Top_2	
INS_17_Poulain_Fork		INS_18_Poulain_Screw_Fork	
INS_19_Poulain_Drill_Guide_Cage		INS_21_Poulain_Moov_Lock_Screw	
		INS_7_Moov_Plate	
INS_22_Poulain_Drill_Guide_Plate		INS_22_Poulain_Drill_Guide_Plate_Locked	
INS_24_DRILL Ø2.5mm		INS_25_Poulain_Guide_RX	
INS_9b+ INS_67_ScrewDriver		INS_11_Handle_Drill_Guide	
INS_12_Needle		INS_68_ INS_68 Clé Allen Torx T10	
INS_69_Pic Ancillère L15 T10 M4		INS_70_Pic Ancillère L10 T10 M4	
INS_71_Pic Outil Femelle T10		INS_79_DRILL Ø2.mm	
INS_75__ BAGUE DIAM 2 DRILL		INS_76_ BAGUE DIAM 2.5 DRILL	
INS_83__ BAGUE DIAM 8		INS_81_DRILL Ø8mm	

## REFERENCE OF IMPLANTS POULAIN

IMP_18_Poulain_Spine_Cage L25 IMP_108_Poulain_Spine_Cage L30 IMP_109_Poulain_Spine_Cage L35		
IMP_19_Poulain_Screw_Spine_Cage_L21.5		
IMP_20_Poulain_SpinePlate_90 IMP_21_Poulain_Lock_Screw IMP_22_Poulain_M2_Screw		
IMP_26_Poulain_Spine_Plate_80 IMP_21_Poulain_Lock_Screw IMP_22_Poulain_M2_Screw		
IMP_110_Poulain_Spine_Plate_70 IMP_21_Poulain_Lock_Screw IMP_22_Poulain_M2_Screw		
IMP_23_Poulain_Screw_SpinePlate_L28.5		
IMP_24_Poulain_Screw_SpinePlate_L32		
IMP_25_Poulain_Screw_SpinePlate_L36		
IMP_67_Poulain_Screw_SpinePlate_Lock_L28,5		
IMP_68_Poulain_Screw_SpinePlate_Lock_32		
IMP_69_Poulain_Screw_SpinePlate_Lock_36		

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12 rue de la Tuilerie  
94440 Marolles-en-Brie  
France

[www.3dhorse.fr](http://www.3dhorse.fr)  
[info@3dhorse.fr](mailto:info@3dhorse.fr)